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Airway 101:
Airway adjuncts and intubation aids

By the perioperativeCPD team

This module is part of a series for beginners new to anaesthetics or those wishing to renew their knowledge. Airway adjuncts are designed to increase the success rate of basic airway manoeuvres, help maintain spontaneous respiration or ensuring successful bag-mask ventilation. Intubation aids are used to help the passing of an endotracheal tube through the cords rather than to help with laryngoscopy.

It covers the following airways adjuncts and intubation aids (section 1.6):

- Anaesthetic face masks
- Oropharyngeal (Guedel) airways
- Berman airways
- Nasopharyngeal airways
- Gum elastic bougies
- Frova intubating introducer
- Stylets
- Aintree catheter
- Magill forceps

Anaesthetic face masks

Face masks have a soft seal that fits over the patient's nose and mouth. The seal permits non-invasive positive pressure ventilation, and allows the effective administration of 100% oxygen.

Depending on the type of mask the cuff volume may be adjusted through a valve. A somewhat under-inflated cuff usually achieves a better seal than a fully inflated one. All masks in current use in the UK are disposable although the environmental costs of single use products may change this in the future.

Most modern masks are made of clear plastic as they:

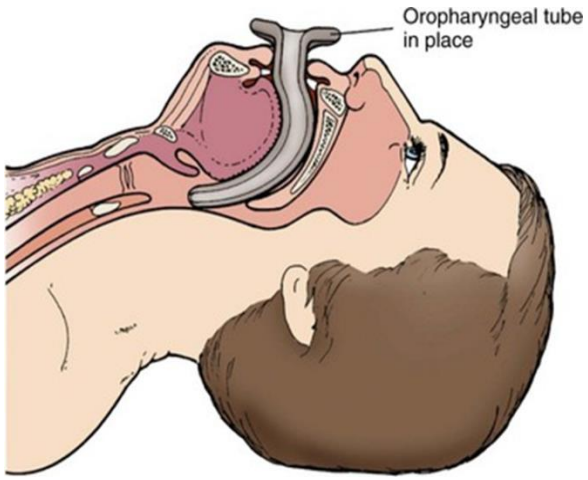
- Increase patient comfort (many patients disliked the black rubber masks)
- Help in assessing patient colour (hypoxia and cyanosis)
- The condensation on the inside of the mask, as the patient exhales, acts as a simple visual monitor of respiration
- Allow the user to see any regurgitation, vomit or secretions from mouth or nose

Note: The head harness ring seen above was for the Clausen harness which used to allow facemask anaesthesia while allowing the anaesthetist to keep both hands free. Since the introduction of supraglottic airways these are rarely used and there is pressure to eliminate the entirely due to the environmental waste.

The Guedel airway (oropharyngeal airway)

An oropharyngeal airway (also known as an OPA or Guedel airway) is an airway adjunct used to help maintain a patent airway. The airway prevents the tongue from obstructing the airway. The oropharyngeal airway was designed by Arthur E. Guedel, an American anaesthetist (1883-1956) thus the name.

Oropharyngeal airways are usually indicated for unconscious patients because if placed in an awake patient, a Guedel airway may lead to gagging, laryngospasm or regurgitation.



Nasopharyngeal airways are mostly used when the patient has a gag reflex, due to the fact that it can be used on a conscious patient, whereas the oropharyngeal airway cannot.

The bite portion is straight and fits between the teeth. It is made of hard plastic to prevent occlusion of the air channel should the patient bite the oropharyngeal airway. The air channel also allows the passing of suction catheters. They have a flange that rests against the patient's lips and prevents the device from being inserted too deeply into the mouth.

They come in nine ISO standardised sizes from the smallest ‘000’ to the largest ‘6’. The typical adult sizes are green (3), orange (4), and red (5) by increasing size

The correct size oropharyngeal airway is chosen by measuring against the patient's head where the flange is aligned with the centre of the lips and the tip to the angle of the jaw. The airway is then inserted into the patient's mouth upside down. Once contact is made with the back of the throat, the airway is rotated 180 degrees. This method prevents the tongue being pushed back into the pharynx, causing further obstruction.

They are commonly used in patients who have no teeth, e.g. infants or the elderly, as the mid-face (cheeks) has a tendency to collapse.

In children, the airway is inserted right side up (to avoid trauma to the soft tissues).

Note: Oropharyngeal airways are one of the commonest causes of damage to teeth in anaesthetised patients.

Berman Airway

The Berman airway is a helpful device for oral fibre-optic intubation, with a shape similar to a Guedel airway.

It has a channel accommodating a fibre-optic scope which opens at one side. It has three roles. The first is to act to guide the fibre optic scope around the back of the tongue to the larynx, while both maintaining the patient's airway and acting as a bite block, thus preventing damage to the fibrescope.

After successful intubation the Berman airway can be 'broken' open and removed from around the scope before the tube is railroaded into the trachea. The Ovassapian airway is a similar type of airway also used for fiberoptic intubation.

Nasopharyngeal airways

Nasopharyngeal airways provide an airway in patients with an intact gag reflex, trismus (lockjaw) or oral trauma and can help prevent the tongue from collapsing against the posterior wall of the oropharynx. The far end (distal) sits just above the epiglottis and below the base of the tongue. Unlike the rigid oral airways, these devices are soft.

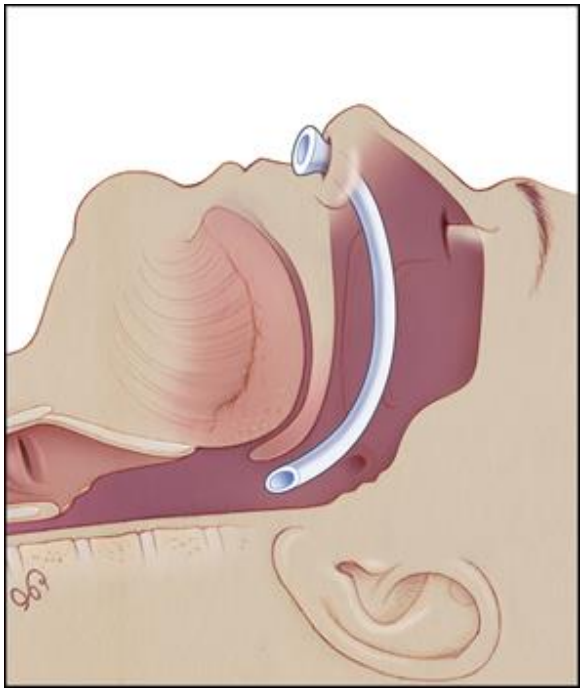
They have a bevelled tip to reduce the risk of trauma to the nasal passage during insertion. But there is still the possibility of causing trauma inside the nasal cavity and nosebleeds are a disadvantage of these devices.

Uses

Nasopharyngeal airways are most commonly used in emergency situations, but may also be used in anaesthetised patients who have poor mouth opening. They are also sometimes used on awake patients, often after an anaesthetic as they are better tolerated and do not produce a gag reflex like a guedel airway.

Nasal airways should not be used in the presence of base-of-skull fractures or patients who are liable to severe bleeding.

How to use it



The nasopharyngeal airway is traditionally sized by matching its diameter with that of the patient's little finger. This should only be taken as an estimate, commonly 6 mm in an adult female and 7 mm for an adult male.

The airway is lubricated with aqueous gel and inserted gently into a nostril. It is passed directly vertically through the nose with the bevel facing the septum and along the rear (posterior) pharyngeal wall. Excess force should not be used during insertion as a false passage may be created.

In older designs a safety pin is inserted through the flange to prevent loss of the airway into the nose. Modern designs have a larger flange and therefore do not need this.

Magill forceps

Magill forceps are shaped to enable manipulation of objects within the oropharynx without the operator's hand being in the line of sight. They are designed for right handed use and come in adult and paediatric sizes.

Other uses include the insertion and removal of throat packs and removal of foreign bodies in the oropharynx and larynx.

Cautions

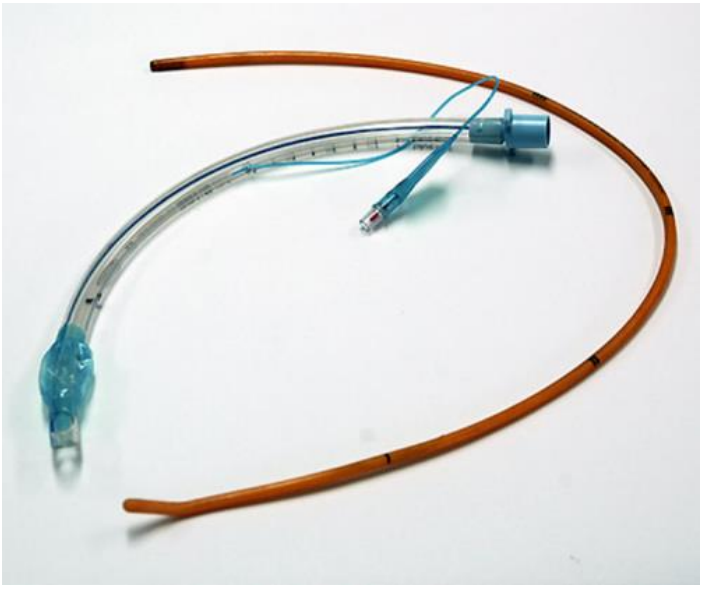
The forceps' grip surface is serrated and care must be taken not to rupture the cuff when manoeuvring the ET tube.

For the same reason only airway equipment and not tissue should be manoeuvred with the forceps as significant trauma and bleeding can result.

Gum elastic bougies

Bougies or more correctly, introducers, are used when a good view of the larynx is not available during traditional laryngoscopy. The larynx may be only partially visualized or hidden behind the epiglottis and beyond reach with the normal curvature of a tracheal tube.

The bougie is inserted through the vocal cords using a laryngoscope, and then an endotracheal tube (>6.0mm) is railroaded over the bougie into the airway, after which it is removed. It is essential that it is not inserted to far or against resistance otherwise trauma can and does occur.



The original reusable gum elastic bougie was 60cm long with a 5 mm diameter and an angled 'coude' tip. It is not in fact made of gum or elastic. I was made by coating a beige resin over fibreglass, which allowed it to retain some of its shape when bent.

A characteristic bumping or clicking is felt in most tracheal placements as the bougie is advanced down the tracheal cartilages, but not felt in oesophageal placements.

Intubating introducers (Frova)

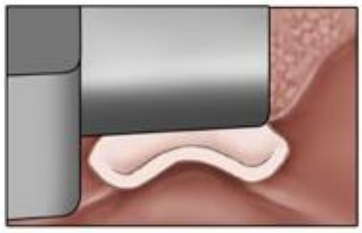
There are newer designs of introducers or bougies available from a variety of manufacturers and these are often single use.

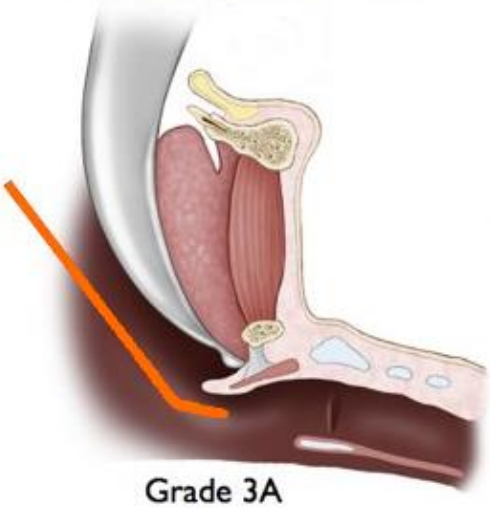
The Frova intubating introducer was invented by the Italian anesthesiologist Dr. Giulio Frova, and released in 1996.

Adult (14 Fr) 70cm and paediatric (8 Fr) 45cm sizes are the most common and have cm markings starting 5 cm from the tip. The narrow diameter allows visualisation of the airway anatomy in comparison to an ETT.

The paediatric introducer can be used with endotracheal tubes 3.0 mm and wider and the adult introducer with endotracheal tubes 6.0 mm and above.

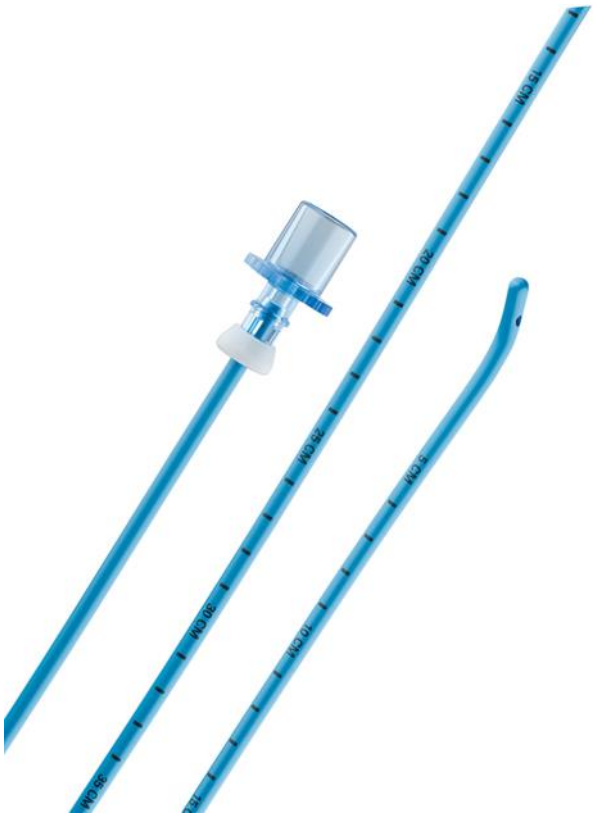
The catheter contains a central lumen for oxygenation, which opens through two side holes at the blunt and closed tip. The tip of the catheter is bent in a way similar to that of a gum-elastic bougie, ('coude' tip) which is designed to help its passage through the glottis.





The indications for using the Frova catheter are the same as the gum-elastic bougie, that is 'standard' intubation with a conventional laryngoscope when visualisation of the larynx in suboptimal. It can also be used for airway exchange and for emergency surgical cricothyroidotomy (scapel, bougie, tube).

A Frova allows for the possibility of delivering oxygen through either a jet vent luerlock connector or a standard 15mm connector. These should only be used in emergency situations and can cause extreme trauma if O_2 is introduced when the tip of the bougie is incorrectly placed. This technique is not part of the DAS guidelines for management of unanticipated difficult intubation.



Precautions

Excessive force, passage beyond the carina, or blind introduction may result in soft tissue damage or cause rupture of the bronchus.

Stylets

Stylets are made from plastic coated, malleable metal that is used to stiffen and provide curvature to an endotracheal tube. Lubrication of the stylet may help removal after the ETT is placed.

After the stylet is placed through the endotracheal tube, the tube can be bent into the desired shape, either matching the Macintosh blade or a “hockey stick” shape. Often lubing the tube with a water-based lubricant (aqua-gel) will help withdrawing the stylet.

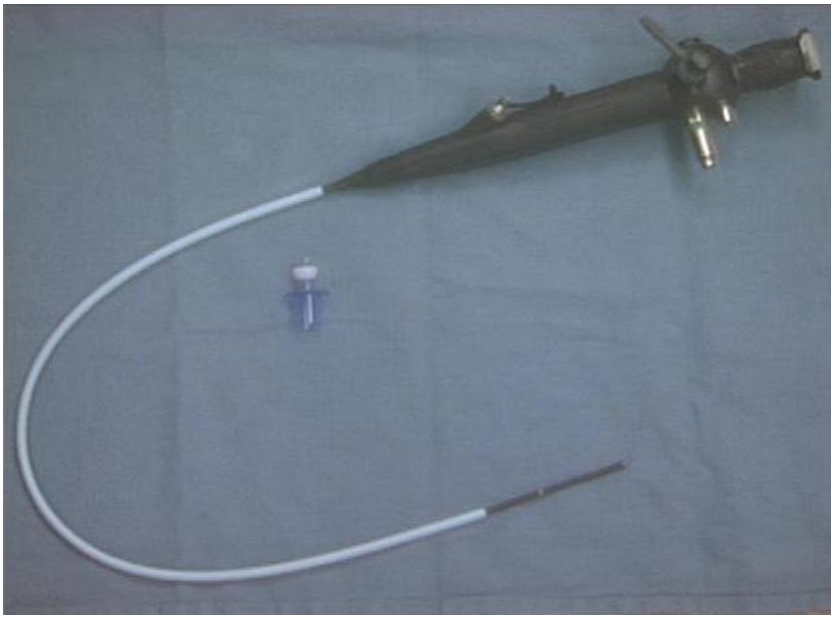
Although stylets are not necessary with direct laryngoscopy, they can often help facilitate manipulation of the endotracheal tube in the airway.

An armoured/ reinforced tube often requires a stylet as it is more 'floppy' than the standard endotracheal tube and does not maintain a natural curvature well during intubation.

The tip of the stylet should not extend past the end of the tube and be located well within the lumen of the ET tube. You should stop advancing the ET tube into the trachea once the tip of the ET tube (but not the tip of the stylet) has just passed the vocal chords.

Then withdraw the stylet, while holding the tube steady before advancing it further into the trachea.

Intubation catheter for fibreoptic intubation (Aintree catheter)



This modified catheter with an increased internal diameter is designed to fit over a 4.5 mm or less fibre-optic scope

The Aintree intubation catheter is primarily used for intubating through a laryngeal mask or other supraglottic airway with fibre-optic guidance.

It is 56 cm long, which allows the flexible tip of the bronchoscope to remain free. It is designed to take a 6.5/7.0mm ETT (a 6.0mm ET tube is definitely too small).

In reality intubating through an LMA using an Aintree is difficult and has a low first time success rate, even with experienced operators.

The catheter is supplied with two Rapi-Fit® connectors, one with a standard 15 mm tube connector and the other one with a Luer-lock connector for rescue oxygenation.

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